J. Raptor Res. 34(1):42–44

Diet of Autumn Migrating Northern Saw-whet Owls on the Eastern Shore of Virginia

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Key Words: *Northern Saw-whet Owl*; Aegolius acadicus; *diet*; *migration*; *pellet analysis*; *stomach-content analysis.*

Although numerous studies have been conducted on the diet of Northern Saw-whet Owls (*Aegolius acadicus*), these accounts are almost exclusively limited to the spring breeding season (e.g., Cannings 1987, 1993, Marks and Doremus 1988) or the winter (e.g., Grove 1985, Swengel and Swengel 1992, Holt and Leroux 1996). It is well-known that many saw-whet owls make annual migratory movements to lower latitudes in the eastern and central U.S. (Mueller and Berger 1967, Holroyd and Woods 1975, Weir et al. 1980, Duffy and Kerlinger 1992, Brinker et al. 1997). However, little is known about saw-whet owl diets during autumn migration. The objectives of our study were to determine the diet of autumn migrating saw-whet owls, compare these results with data available from previous diet studies, and compare results obtained from pellet versus stomach-content analyses.

Study Area and Methods

Since 1994, migrating saw-whet owls have been trapped and banded each autumn just south of the city of Cape Charles (37°10′N, 75°50′W) on the eastern shore of Virginia (Whalen et al. 1997). Banding operations commenced during late October and ended in mid-December each year. Captured owls were kept in holding boxes before being banded and released. Although individuals were only kept in holding boxes for a short period of time, owls occasionally regurgitated pellets while in the boxes. From 1995–97, 1236 individual saw-whet owls were captured, from which a total of 53 pellets was obtained. These pellets were later dissected and prey remains were identified to the most precise taxonomic group possible. In addition to prey data collected from pellets, stomach contents were determined from 15 road-killed saw-whet owls found within 24 km of Cape Charles, mostly on U.S. Route 13. All road-kills were collected during autumn or early winter.

Results and Discussion

We identified 89 prey items from 53 saw-whet owl pellets (Table 1). Based on pellet analysis, lepidopterans comprised 42.7% of all individual prey items taken by saw-whet owls. However, 78.9% of these insects were found in only two owl pellets containing 20 and 10 adult lepidopterans, respectively. Only six out of 53 pellets (11.3%) were found to contain insect remains and most of these also contained vertebrate prey. Thus, based on pellets alone, only a small fraction of saw-whet owls showed evidence of consuming insect prey.

Vertebrate prey remains were identified in 51 out of 53 pellets. Rodents and shrews comprised 96.1% of vertebrate prey. The most common prey species were white-footed mice (*Peromyscus leucopus*) and house mice (*Mus musculus*). Other prey identified to species included short-tailed shrews (*Blarina brevicauda*), a southern flying squirrel (*Glaucomys volans*), a silver-haired bat (*Lasionycteris noctivagans*) and a Vesper Sparrow (*Pooecetes gramineus*).

Out of 15 road-killed saw-whet owl stomachs analyzed, eight were empty and seven contained prey remains. In contrast to diet evidence from pellet analysis, five out of seven stomachs with prey remains contained insects. Ten individual prey items were identified from stomach contents, eight of which were insects and two of which were rodents (Table 1).

Although rodents probably comprise most of the prey biomass consumed by saw-whet owls migrating through the lower Delmarva Peninsula, the number of insect prey items is notable. More than 40% of prey items identified in pellets were lepidopterans. This stands in sharp contrast to findings from numerous breeding and winter diet studies (but see Hobson and Sealy 1991). Cannings (1993) summarized prey items taken by saw-whet owls in eastern North America, reporting that insects represented less than 1% of all prey items. More insects were identified from 53 pellets in our study than from several thousand pellets among all studies included in Cannings' account.

Our results from stomach analysis of road-killed owls provides even greater evidence that insects comprise an important part of the diet of migrating saw-whet owls. Since softer, more easily digested prey items such as invertebrates are often under represented in pellets, studies that rely exclusively on pellet analysis may poorly reflect actual diet composition. Although our sample size is small, 80% of prey items from stomach contents were

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Table 1. Prey remains of Northern Saw-whet Owls migrating through the eastern shore of Virginia during autumn 1995–97. Data are presented for prey items obtained from pellets ($N = 53$) regurgitated by captured owls and from stomach contents of road-killed owls ($N = 15$).

	Pellet Remains		Stomach Contents	
Prey Type	No. Prey Items[a]	Percent	No. Prey Items[a]	Percent
Mammals				
Short-tailed shrew (*Blarina brevicauda*)	3	3.4	1	10.0
White-footed mouse (*Peromyscus leucopus*)	11	12.4	0	0.0
House mouse (*Mus musculus*)	7	7.9	1	10.0
Southern flying squirrel (*Glaucomys volans*)	1	1.1	0	0.0
Unidentified rodent[b]	27	30.3	0	0.0
Silver-haired bat (*Lasionycteris noctivagans*)	1	1.1	0	0.0
Birds				
Vesper Sparrow (*Pooecetes gramineus*)	1	1.1	0	0.0
Insects				
Lepidoptera spp.	38	42.7	6	60.0
Homoptera spp.	0	0.0	1	10.0
Orthoptera spp.	0	0.0	1	10.0
Total	89[b]		10	

[a] Some individual pellets and stomachs contained multiple prey items.
[b] Most unidentified rodent remains consisted of post-cranial bones and bone fragments.

insects and one-third of road-killed owls contained insects in their stomachs. This finding was comparable to that of Hobson and Sealy (1991), who found substantial quantities of invertebrate prey remains in the stomachs of resident saw-whet owls on the Queen Charlotte Islands during the nonbreeding season. In their study, the majority of stomachs of road-killed owls contained marine invertebrate prey. Thus, small mammals probably represent the chief prey type for saw-whet owls throughout most of the year. However, invertebrate prey items may be taken opportunistically, especially during times when vertebrate prey abundance is low or unpredictable.

In recent years, the number of saw-whet owls trapped during migration in the Northeast has varied dramatically (Brinker et al. 1997, Whalen et al. 1997). The magnitude and dynamics of migratory movements by this species may be closely linked to the availability of prey relative to regional saw-whet owl population sizes. To the best of our knowledge, our study represents the first published account of the food habits of saw-whet owls during autumn migration. More information is needed on the diet composition of saw-whet owls, especially during summer and fall. In addition, information on small mammal and insect abundances along known saw-whet owl migration routes could help to clarify the relationship between prey levels and the migratory behavior of saw-whet owls.

RESUMEN.—Los hábitos alimenticios de *Aegolius acadius* durante su migración de otoño en la costa este de Virginia fueron documentados utilizando un análisis de egragrópilas y contenidos estomacales. La mayoría de las presas (96.1%) encontradas en las egagrópilas fueron roedores, especialmente *Peromyscus leucopus* y *Mus musculus*. Una larga proporción de insectos lepidópteros (42.7%) fueron tambien encontrados, pero en menor número de egragópilas. Otros tipos de presas en las egagrópilas incluyeron *Blarina brevicauda, Glaucomys volans, Lasionycteris noctivagans* y *Poocetes gramineus*. Los estómagos de 7 de 15 buhos muertos en las carreteras contenían comida. En contraste a los resultados de los análisis de egagrópilas, 80 de los items de presas identificadas de los estómagos fueron insectos. Por lo tanto el análisis de egagrópilas y contenidos estomacales pueden conducir hacia diferentes conclusiones acerca de la dieta de los buhos. En resúmen estos resultados sugieren que los insectos juegan un papel importante en la dieta de la migración de *Aegolius acadicus* aunque los roedores representan la

mayoría de la biomasa de presas consumidas por esta especie.

[Traduccion de César Márquez]

ACKNOWLEDGMENTS

This manuscript benefited from the comments of R. Cannings, K. Duffy and J. Marks. We thank C. Handley, Jr. for assistance with small mammal identification, R. Laybourne for identifying the bird remains and A. Solis for identification of insects. We also thank D. Bradshaw, S. Flickinger, D. Schwab, B. Sullivan, G. Williamson, M. Wilson and J. Wood for collecting road-killed saw-whet owls. Funding for the owl banding project was provided by the Center for Conservation Biology at the College of William and Mary.

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Received 1 April 1999; accepted 31 October 1999